

gests the bringing together of all pertinent facts which might help to resolve a particular question or problem. This involves searching for materials, weighing their worth, organizing the facts, reaching and verifying conclusions. In problem-solving are the very elements of the scientific attitude toward all learning.

In the spring of 1950 the entire program of the fourth annual convention of the National Science Teachers Association was devoted to "Problem-Solving: How We Learn." For three days the convention participants listened to discussions on: "Problem-Solving—What Is It?"; "Problem-Solving Ability—How Can It Be Acquired?"; "Effectiveness of Problem-Solving Education—How Can It Be Evaluated?" If problem-solving was considered so important by a national convention of science teachers, then, it seems, it should be worthy of careful study by all science teachers.

When learning takes place there is change in behavior. In science classes, during this period of 180 days, the task of the teacher is to work with all pupils so that changes in behavior do take place and so that pupils are guided into profitable and worthwhile directions. How does this learning take place? In the book *The Learning of Mathematics—Its Theory and Practice*, published by the National Council of Teachers of Mathematics, Washington, D. C., 1953, p. 7 and 8, there is an excellent discussion of this topic.

At the start of learning or readjustment of behavior, there must be a situation in which the student feels a need. A need is the feeling of the organism for something which is absent, the attainment of which will tend to give satisfaction. The situation is such that the student is motivated to satisfy a need. This creates tensions and drive within the organism which impel it toward its goal. Thus the learner is spurred to physical and mental action, or making a response. The first response often does not lead to the goal; he runs against a barrier. If the motivation to learn is strong enough, the learner seeks another response or series of responses. One after another of these responses may fail to lead to a solution, but finally he selects a path of action that reaches the goal. He has solved the problem; he is ready to readjust his total behavior in this situation. He may go over the solution, to make the meaning and structure more precise, and his formulation more articulate; to make the whole situation more highly differentiated from previous learning, and more generalized until he has developed a new pattern of behavior that will function in new problems containing the same or similar situations. He has learned.

Helping students to learn and thus bring about desirable changes in behavior is not a simple job that can be left to chance, as the above discussion clearly indicates. The first problem-solving situation for the teacher is to help students want to know